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**PATENT**  
**ATTY. DKT. NO. 3188.001**

## **METHOD AND APPARATUS FOR ESTIMATING THE WEIGHT OF HORSES**

### **CROSS-REFERENCE TO RELATED APPLICATIONS**

**[0001.]** Not Applicable.

### **STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH AND DEVELOPMENT**

**[0002.]** Not Applicable.

### **BACKGROUND OF THE INVENTION**

**[0003.]** There are many instances where determining an accurate weight of a horse is desirable, if not essential for proper medication, feeding, training and health monitoring requirements. Equine scales for weighing horses are available. Equine scales are large pieces of machinery which are typically expensive and inaccessible. For example, in many situations veterinary care must be administered in the field as opposed to a clinical setting. While the veterinarian may have an equine scale at her place of business, such scale may not be accessible when the veterinarian is working in the field.

**[0004.]** For these reasons, methods have been developed for estimating the weight of the horse. One such method has been visual weight estimation, based only upon observation of the horse. This method has proven to be the least reliable and typically results in substantial estimation errors. Usually, such estimation errors result in a significant under estimation of weight.

**[0005.]** Another method utilizes the girth measurement of a horse to estimate a weight. The practical application of this method involves the use of a girth weight tape which is stretched around the heart girth of a horse. Printed on the girth weight tape are weight estimates corresponding to the girth measurement. Where the tape overlaps after being wrapped around the girth, the indicated weight is read from the tape. The girth measurement calculation method is more accurate than the visual estimation method in predicting a horse's weight.

**[0006.]** Yet another method utilizes both girth and length measurements of a horse to estimate a weight. The girth and length measurement method is more accurate than either the visual estimation method or the girth measurement calculation method. Although the girth and length measurement method is more accurate than either the visual weight estimation or the girth measurement method, substantial estimation errors are still made.

**[0007.]** In light of the foregoing, the need exists for a more accurate weight estimation method which can be utilized in the care and management of horses

thereby resulting in advanced equine health and nutrition, better training results and improved overall health monitoring. It is to such an improved method of estimating the weight of a horse that the present invention is directed.

## SUMMARY OF THE INVENTION

**[0008.]** The present invention relates to a method and apparatus for estimating the weight of horses. It is envisioned that the present invention will be utilized in the care and management of horses thereby resulting in advanced equine health and nutrition, better training results, and improved overall health monitoring.

**[0009.]** Broadly, to estimate the weight of a horse, a girth, a length, and a height of the horse is measured. The measurement can be taken with commercially available measurement tapes, for example. The weight of the horse is then estimated based on the girth, the length and the height of the horse.

**[0010.]** Utilizing the present invention, a more accurate estimate of the horse's weight has been made. For example, in one embodiment, weight estimates produced in accordance with the present invention produced an adjusted  $R^2$  of .097559 compared to an adjusted  $R^2$  of .095349 for the next most accurate prior art model, i.e., the girth and length measurement method discussed above. By using the present invention, the general health and welfare of horses can be improved significantly by eliminating under dosing or over dosing of medication, preventing

improper nutritional decisions and enhancing training regimens while improving the overall health monitoring of horses.

**[0011.]** In one aspect of the present invention, an apparatus for estimating the weight of a horse is provided. The apparatus includes an input unit, a storage unit, a computer unit, and an output unit. The input unit is adapted to receive a measured height, a measured girth, and a measured length of the horse. The storage unit stores weight estimation logic adapted to estimate the weight of the horse based on the measured height, the measured girth and the measured length of the horse. The computer unit receives the measured height, the measured girth and the measured length of the horse and executes the weight estimation logic to estimate the weight of the horse. The output unit outputs a signal indicative of the weight of the horse in a format perceivable by an individual.

**[0012.]** The apparatus can be in the form of a handheld calculator, a desk top computer, or a laptop computer, for example.

**[0013.]** In yet another aspect of the present invention, a software program capable of running on a computer for estimating the weight of a horse is provided. The software program can be stored on a storage unit, such as a hard disk, a CDROM, a memory or the like. The software program is provided with input logic, weight estimation logic, and output logic. The interface logic is adapted to receive a measured height, a measured girth, and a measured length of the horse. The

weight estimation logic estimates the weight of the horse based on the measured height, the measured girth and the measured length of the horse. The output logic generates an estimated weight indicative of the weight of the horse. In one preferred embodiment of the present invention, the input logic and the output logic are implemented as a computer screen populated with appropriate fields to permit the measured height, the measured girth, the measured length, and the estimated weight to be entered and displayed.

**[0014.]** Thus, it will be understood by those skilled in the art that the present invention provides more accurate weight estimates than methods currently available so that more accurate medication dosages, feed and nutrition considerations, training and racing performance and health monitoring requirements can be provided.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

**[0015.]** FIG. 1 is a top plan view of an apparatus, constructed in accordance with the present invention, for estimating the weight of a horse.

**[0016.]** FIG. 2 is a side elevational view of a horse illustrating measurements of such horse being taken in accordance with the present invention.

**[0017.]** FIG. 3 is a diagrammatic view of a software program, constructed in accordance with the present invention, for estimating the weight of a horse.

## DETAILED DESCRIPTION OF THE INVENTION

**[0018.]** Referring now to the drawings, in particular to FIG. 1, shown therein and designated by the referenced numeral 10 is an apparatus, constructed in accordance with the present invention, for estimating the weight of a horse 12 (FIG. 2). In general, the apparatus 10 is provided with an input unit 14, a storage unit 16, a computer unit 18, and an output unit 20.

**[0019.]** As best shown in FIG. 2, the horse 12 is standing on the ground 36. As will be well understood by those skilled in the art, the horse 12 is provided with withers 40, a shoulder 42 and a buttocks 44. The shoulder 42 has a point 46, and the buttocks 44 have a point 48. The point 46 is typically at the outermost portion of the shoulder 42. Likewise, the point 48 is an outermost portion of the buttocks 44.

**[0020.]** The measured height 30 is obtained by measuring the distance from the ground 36 to a top 50 of the withers 40 of the horse 12. The measured girth 32 can be obtained by measuring about the heart girth 32 with a measuring tape snug against the horse 12 following respiratory expiration. For example, the measured girth 32 can be taken using a commercially available measuring tape.

**[0021.]** The measured length 34 of the horse 12 can be obtained by measuring the distance from the point 46 of the shoulder 42 to the point 48 of the buttocks 44 in a straight line. In other words, the measured length equals the distance from the tuber ischium to the point 46 of the shoulder 42. Once the measured height 30,

measured girth 32 and the measured length 34 of the horse 12 are determined, the input unit 14 is utilized to enter the measured height 30, the measured girth 32 and the measured length 34 into the apparatus 10. For example, as shown in FIG. 1, the input unit 14 can be a keyboard. However, it should be understood that the input unit 14 can be any type of input unit capable of entering in the measured height 30, measured girth 32 and the measured length 34 into the apparatus 10. For example, the input unit 14 can be a microphone and the measured height 30, measured girth 32, and the measured length 34 can be spoken into the microphone.

**[0022.]** The storage unit 16 stores weight estimation logic adapted to determine an estimated weight of the horse 12 based on the measured height 30, the measured girth 32 and the measured length 34 of the horse 12. The storage unit 16 can be any type of medium which can be read by the computer unit 18. For example, the storage unit can be an optical storage unit, a magnetic storage unit, or any other type of suitable storage unit such as an EEPROM, a ROM, or the like. The weight estimation logic will be discussed in more detail below.

**[0023.]** The computer unit 18 receives the measured height 30, the measured girth 32 and the measured length 34 of the horse 12 and executes the weight estimation logic so as to estimate the weight of the horse 12 based on the measured height 30, the measured girth 32 and the measured length 34. The computer unit 18 can be any type of computer capable of receiving the measured height 30, the

measured girth 32 and the measured length 34 of the horse 12 and executing the weight estimation logic so as to estimate the weight of the horse 12. For example, the computer unit 18 can be a central processing unit, a digital signal processor or a logic control unit, each of which is well known in the relevant art. Thus, no further comments are deemed necessary to one skilled in the art how to make or use the computer unit 18.

**[0024.]** The output unit 20 outputs an estimated weight 54 indicative of the estimated weight of the horse 12 in a format perceivable by an individual. For example, the output unit 20 can output the estimated weight 54 in an audio format, a video format, or a combination thereof. As shown in FIG. 1, the estimated weight 54 can be provided as alphanumeric characters displayed on a display device, such as a LCD screen.

**[0025.]** In a preferred embodiment shown in FIG. 1, the input unit 14 is provided with a girth button 56, a height button 58 and a length button 60. To estimate the weight of the horse 12 utilizing the apparatus 10, an individual determines the measured height 30 as discussed above, and then enters the measured height 30 via the input unit 14 into the apparatus 10. The individual then punches the height button 58. The individual then determines the measured girth 32 as discussed above, and enters such measured girth 32 into the apparatus 10 via the interface unit 14. The individual then punches the girth button 56 to store the measured girth



32 in the storage unit 16. The individual then determines the measured length 34 as discussed above, and then enters the measured length 34 into the apparatus 10 utilizing the interface unit 14. The individual then punches the length button 60 to store the measured length 34 in the storage unit 16. The individual then punches a weight estimation button 62 to cause the computer unit 18 to execute the weight estimation logic stored in the storage unit 16 to determine the estimated weight 54 of the horse 12. Once the weight estimation logic has executed, the estimated weight 54 is displayed or otherwise outputted in a format perceivable by the individual.

**[0026.]** In the preferred embodiment shown in FIG. 1, the apparatus 10 is in the form of a handheld calculator. However, it should be understood that the apparatus 10 can be implemented in many other forms. For example, as will be discussed below, the apparatus 10 can be implemented as a desktop computer, a laptop computer, a palm computer or any other device, such as a cellular telephone, capable of executing the weight estimation logic as discussed herein.

**[0027.]** Referring now to FIG. 3, shown therein and designated by a reference numeral 70, is a software program, constructed in accordance with the present invention, for determining the estimated weight of the horse 12. The software program 70 is adapted to be run on a computer, such as a desktop computer, a laptop computer, a notebook computer, a mainframe computer, a personal data

assistant (PDA), a cellular telephone, a pre-programmed calculator or a user programmable calculator. In general, the software program 70 is provided with input logic 72, weight estimation logic 74 and output logic 76. The software program 70 is stored on any suitable type of storage unit. The storage unit for storing the software program 70 can be any device capable of storing data in a format readable by a computer. For example, the storage unit can be an optical disk suitable for reading by an optical drive, a magnetic disk (hard or floppy) suitable for reading a magnetic drive, a memory unit (RAM or ROM) or the like.

**[0028.]** The software program 70 can be run on any suitable type of computer, such as a hand held calculator, a desktop computer, a laptop computer, a palm computer or any other device, such as a cellular telephone or a personal data assistant, capable of executing the weight estimation logic 74 as discussed herein. The software program 70 can be run on a remote computer, such as a website. In this case, the input logic 72 and the output logic 76 could gather and output data from any device having a browser program, such as a personal computer, a cellular telephone or personal data assistant.

**[0029.]** The input logic 72 is adapted to receive the measured height 30, the measured girth 32, and the measured length 34 of the horse 12. The weight estimation logic 74 determines an estimated weight 78 of the horse 12 based on the

measured height 30, the measured girth 32 and the measured length 34 of the horse 12. The output logic 76 outputs the estimated weight 78.

**[0030.]** In a preferred embodiment of the software program 70, the input logic 72, and the output logic 76 are implemented as a computer screen 80 populated with a plurality of fields 82, 84, 86, and 88 so as to permit the measured height 30, measured girth 32, the measured length 34, and the estimated weight 78 to be entered and displayed.

**[0031.]** More specifically, the field 82 receives the measured girth 32. The field 84 receives the measured height 30. The field 86 receives the measured length 34. The estimated weight 78 is displayed in the field 88.

**[0032.]** The weight estimation logic 74 can be linked to the computer screen 80 via any suitable logic, such as a weight estimation button 90 disposed on the computer screen 80.

**[0033.]** To determine the estimated weight of the horse 12 utilizing the software program 70, an individual determines the measured height 30 as discussed above, and then enters the measured height 30 into the field 84. The individual then determines the measured girth 32 as discussed above, and enters such measured girth into the field 82. The individual then determines the measured length 34 as discussed above, and then enters the measured length 34 into the field 86. The individual then clicks on or otherwise actuates the weight estimation button 90 to

cause the software program 70 to execute the weight estimation logic 74 to determine the estimated weight 78 of the horse 12. Once the weight estimation logic 74 has been executed, the estimated weight 78 is displayed or otherwise outputted in a format perceivable by the individual. For example, the estimated weight 78 could be provided in an audio format, a video format, a printed format or a combination thereof.

**[0034.]** As will be well understood by those skilled in the art, once the estimated weight 78 is provided, an owner, a veterinarian or other care provider of the horse 12 can then use the estimated weight 78 to provide care for the horse 12. For example, the estimated weight 78 can be used to determine dosages of medications, such as anthelmintics (medications for parasites) or anesthesia. The estimated weight 78 can also be used to determine dosages of vitamins or nutrients for the horse 12.

**[0035.]** The weight estimation logic 74 utilized by the software program 70 and the apparatus 14 will now be described in more detail. In general, the weight estimation logic 74 was determined by taking measurements (i.e., the measured height 30, the measured girth 32, and the measured length 34) of a plurality of horses so as to develop a data base including the girth, height and length of a variety of horses. Through regression analysis, and using the variables girth, height and length, the following formula was developed by using the natural logarithm of

actual weight as the dependent variable, and the natural logarithms of girth, height and length as independent variables in the following linear regression equation:

$$\text{Weight Estimate} = k_1 \times \text{Girth}^{x_1} \times \text{Height}^{x_2} \times \text{Length}^{x_3}$$

where  $k_1$  is a constant, and  $x_1$ ,  $x_2$  and  $x_3$  are exponents.

In one preferred embodiment,  $k_1$  is about .003591,  $x_1$  is about 1.638339,  $x_2$  is about .948065 and  $x_3$  is about .397592.

**[0036.]** The foregoing formula produces weight estimates to an accuracy having an adjusted  $R^2$  of about .97559. It should be noted that the units used in each of the examples set forth herein for girth 32, height 30 and length 34 are in inches. However, it should be understood that other units of measurement could also be used so long as the units of measurement are used consistently. The regression analysis can be performed by any type of analysis for fitting curves to a plurality of data points, such as multiple regression methods, linear regression methods, forward stepwise regression methods, and backward stepwise regression methods.

**[0037.]** A second model was produced using similar methods as discussed above to estimate the weight of the horse 12 using the measured height 30, measured girth 32 and the measured length 34. The second model is based on the following mathematical formula:

$$\text{Estimated Weight} = k_2 \times (\text{Girth} \times f_1 + \text{Height} \times f_2 \times \text{Length} \times f_3)^{x_4}$$

where  $k_2$  is a constant,  $f_1$ ,  $f_2$ ,  $f_3$  are factors, and  $x_4$  is an exponent.

**[0038.]** When the units used to determine the measured height 30, measured girth 32 and the measured length 34 are inches, k2 can be about .003633, f1 can be about .056, f2 can be about .031, f3 can be about .13, and x4 can be about .2978070.

**[0039.]** Two additional models were produced using similar methods as discussed above to estimate the weight of the horse 12 using the measured girth 32 and the measured height 30. The third model can be based on the following mathematical formula:

$$\text{Estimated Weight} = K3 \times \text{Girth}^{x5} \times \text{Height}^{x6}$$

where K3 is a constant and x5 and x6 are exponents.

**[0040.]** When the units used to determine the measured height 30, measured girth 32 and the measured length 34 are inches, k3 can be about .003538, x5 can be about 1.989527, and x6 can be about 1.004088. The third model produced weight estimates to an accuracy having an adjusted R<sup>2</sup> of about .97003.

**[0041.]** The fourth model can be based on the following mathematical formula:

$$\text{Estimated Weight} = K4 \times (\text{Girth} \times f4 + \text{Height} \times f5)^{x7}$$

where K4 is a constant, f4 and f5 are factors, and x7 is an exponent.

**[0042.]** When the units used to determine the measured height 30, measured girth 32 and the measured length 34 are inches, k4 can be about .003479, f4 can be

about .63, f5 can be about .37 and x7 can be about 2.999198. The fourth model produced weight estimates to an accuracy having an adjusted  $R^2$  of about .97076. It should be understood that the foregoing values set forth in the formulas discussed above, are only examples of suitable constants, factors and exponents. Also, it should be understood that mathematical techniques other than regression analysis could be utilized to produce similar formulas or results. For example, numerical methods for fitting curves or lines to data, such as splines, polynomials, or factorials could be used. As more horses are measured, weighed and added to the data base, it is believed that such constants may be refined so as to give a more accurate estimate of the weight of the horse 12. The term "about" as used in the claims is intended to cover all such refinements to the constants, factors and exponents so long as the models forming the weight estimation logic determine the estimated weight, as set forth herein.

**[0043.]** Furthermore, it should be understood that the 224 horses provided in the data base were not placed in categories before determining the constants provided in the foregoing models. It is believed that the foregoing models can be made more accurate by categorizing the horses into predetermined different classes before utilizing the multiple regression analysis. For example, the horses could be categorized into specific groupings, such as miniature horses, ponies, light horses, draft horses, or even wild horses and feral horses, horses in show condition and

those that are not, each of which is a category of horses well known in the art. By categorizing the horses in the data base into different specific groupings, it is believed that the constants, factors and exponents discussed herein would be refined to provide a more accurate estimated weight of the horses 12 in each category.

**[0044.]** The apparatus 14 and the software program 70 can include a button, field or other suitable input device to permit selection of a predetermined class before the estimated weight of the horse 12 is determined.

**[0045.]** Examples used for determining each of the models are set forth below. It should be understood that the examples set forth herein are illustrative and not limitative.

<b>Equine Weight Estimation Research Database</b>								
ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
1	1200	2	1	1140	64	76	68	9.0
2	900	2	1	1125	67	72	61	6.0
3	1100	2	1	1150	67	73	63	14.0
4	1100	2	1	1325	71	78	66	6.0
5	1200	2	1	1225	69	75	63	12.0
6	1200	2	1	1285	74	76	64	17.0
7	1200	2	1	1380	74	78	65	7.0
8	1100	2	2	1020	71	75	60	2.0
9	1050	2	2	1025	67	71	61	2.0
10	950	2	1	965	70	66	60	1.3



## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
11	900	2	1	875	61	66	58	1.3
12	925	2	1	920	65	68	60	1.3
13	950	2	4	1040	68	71	62	1.3
14	900	2	4	925	63	68	59	1.3
15	975	2	1	1065	67	71	63	1.3
16	950	2	1	1002	66	69	61	1.3
17	900	2	4	870	64	67	58	1.3
18	925	2	4	960	68	69	59	1.3
19	975	2	1	1005	67	69	61	1.5
20	850	2	4	585	55	57	53	0.5
21	500	2	3	470	53	51	50	0.5
22	525	2	3	615	56	60	52	0.5
23	590	2	3	555	56	55	53	0.5
24	500	2	4	465	51	52	48	0.5
25	450	2	4	485	51	53	50	0.5
26	1000	2	2	1010	70	73	60	20.0
27	800	2	1	774	58	65	52	4.0
28	1200	2	1	1295	70	77	66	5.0
29	1200	2	2	1265	76	75	64	3.0
30	1000	2	2	1070	63	72	60	2.0
31	1000	2	2	1165	69	71	62	3.0

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
32	1000	2	2	970	65	69	61	3.0
33	1000	2	2	968	60	70	59	2.0
34	1000	2	1	1195	69	73	63	4.0
35	1200	2	1	1140	66	73	63	3.0
36	1100	2	2	1165	73	76	62	6.0
37	1000	2	1	998	63	69	63	3.0
38	1000	2	2	1012	66	69	61	3.0
39	950	2	2	980	63	70	62	2.0
40	1100	2	1	1235	67	74	65	3.0
41	1100	2	2	1115	67	71	64	4.0
42	1200	2	1	1052	67	70	64	3.0
43	1200	2	1	1265	70	75	68	3.0
44	1100	2	1	1046	62	69	62	6.0
45	1200	2	1	1220	70	75	67	5.0
46	1000	2	2	1050	65	70	62	2.0
47	900	2	2	724	58	65	51	7.0
48	900	2	2	988	58	71	62	4.0
49	1100	2	1	1084	66	72	63	2.0
50	1000	2	1	996	65	69	63	2.0
51	700	2	1	684	56	60	56	1.0
52	700	2	5	694	60	61	56	1.0
53	950	2	2	998	64	69	62	2.0
54	900	2	2	1096	70	72	60	3.0
55	1000	2	1	974	63	69	63	2.0
56	1000	2	1	1072	64	70	63	2.0
57	1500	3	2	1690	80	84	66	2.0
58	1700	3	1	1865	80	86	72	4.0
59	125	1	2	135	35	36	28	1.0

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
60	130	1	4	151	40	39	32	0.4
61	160	1	1	215	47	42	36	2.0
62	150	1	5	191	41	42	35	11.0
63	190	1	2	207	44	42	35	2.0
64	185	1	5	211	43	43	35	1.0
65	200	1	1	232	45	46	38	4.0
66	325	2	4	413	57	49	51	0.4
67	600	2	5	410	57	51	52	0.4
68	950	2	2	1012	75	53	59	12.0
69	870	2	5	815	74	62	61	1.3
70	850	2	1	890	76	66	59	5.0
72	1000	2	1	998	77	67	63	2.0
73	975	2	1	967	77	68	63	2.0
74	950	2	2	986	74	68	63	3.0
75	1000	2	1	890	74	68	63	7.0
76	940	2	5	910	71	68	63	7.0
78	1150	2	1	1021	74	69	63	5.0
79	1000	2	1	935	76	69	64	9.0
80	977	2	1	980	75	69	63	5.0
81	1350	2	1	1309	84	76	64	10.0
82	1200	2	1	1192	79	76	65	7.0
83	1400	2	1	1375	82	76	67	13.0
84	1350	2	1	1305	81	76	67	6.0
85	1100	2	1	1060	76	70	60	1.0
86	1050	2	2	985	77	70	62	10.0
87	850	2	1	884	72	70	62	7.0
88	1290	2	2	1210	80	72	60	10.0
89	1115	2	1	1107	78	72	62	12.0

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
90	1050	2	1	1100	81	72	63	5.0
91	1110	2	1	1154	80	72	60	3.6
92	900	2	5	1079	79	72	58	1.0
93	1050	2	2	1015	80	72	63	5.0
94	950	2	2	1035	77	72	63	13.0
95	1000	2	1	1003	76	72	63	7.0
96	1200	2	1	1023	77	72	65	15.0
97	1250	3	5	1344	82	73	67	2.0
98	1300	2	1	1143	79	73	59	18.0
99	1200	2	1	1117	80	73	62	2.0
100	1200	2	2	1126	80	73	61	12.0
101	1350	2	1	1116	77	73	65	9.0
102	1215	2	1	1171	81	73	64	3.0
103	1200	2	2	1130	80	73	64	7.0
104	1250	2	1	1204	81	73	64	3.0
105	1200	2	1	1165	78	73	64	9.0
106	1000	2	1	1175	77	73	63	19.0
107	1100	2	1	1075	74	73	64	10.0
109	1310	3	2	1306	84	74	66	1.0
110	1150	2	2	1109	78	74	59	3.0
111	1225	2	2	1225	82	74	61	15.0
112	1300	2	1	1220	82	74	64	17.0
113	1100	2	2	1196	81	74	59	5.0
114	1250	2	1	1190	80	74	63	3.0
115	1275	2	1	1182	83	74	65	7.0
116	1250	2	2	1310	84	74	62	15.0
117	1200	2	1	1280	85	74	66	14.0
118	1250	2	1	1300	82	74	65	14.0

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
119	1300	2	1	1253	84	74	66	25.0
120	1100	2	2	1105	80	74	64	5.0
122	1275	2	2	1187	80	75	64	6.0
123	1280	2	1	1290	86	75	65	7.0
124	1300	2	2	1215	79	75	61	7.0
125	1250	2	1	1203	80	75	63	5.0
126	1250	2	1	1250	79	75	65	9.0
127	1170	2	1	1177	79	75	65	22.0
128	1250	2	1	1188	80	75	65	10.0
129	1280	2	1	1315	81	78	67	10.0
130	700	3	4	745	67	63	58	0.5
132	1100	2	1	1125	77	71	61	4.0
133	1150	2	1	1120	83	71	63	5.0
134	1075	2	1	1170	82	71	62	10.0
135	1150	2	1	1055	74	71	62	5.0
136	1325	2	1	1292	84	77	65	19.0
137	600	3	2	655	63	59	58	0.4
138	1275	2	1	1170	78	76	62	3.0
139	1175	2	2	1190	80	76	62	4.0
140	1550	3	2	1280	86	76	67	2.0
141	2225	3	1	1952	96	85	70	7.0
142	1750	3	2	2175	96	91	70	6.0
143	1500	3	2	1626	92	82	68	5.0
144	1500	3	1	1530	85	83	65	19.0
145	1400	3	1	1460	87	81	67	19.0
146	1775	3	1	1850	91	92	75	12.0
147	1875	3	1	1900	92	92	75	5.0
148	1925	3	1	2200	93	91	75	6.0

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
149	2000	3	1	2100	93	87	76	6.0
150	1765	3	1	1745	91	88	75	9.0
151	1775	3	1	1732	90	83	73	8.0
152	1700	3	1	1674	88	85	72	8.0
153	1600	3	1	1595	89	84	68	8.0
154	1650	3	1	1659	84	85	72	5.0
155	1700	3	1	1682	92	84	71	12.0
156	755	2	2	803	71	67	52	17.0
157	1000	2	2	981	76	70	57	11.0
158	1100	2	1	1040	78	70	59	5.0
159	950	2	2	1013	82	70	58	8.0
160	900	2	4	990	72	70	56	1.0
161	1175	2	2	1035	78	70	57	13.0
162	1150	2	1	1204	81	74	63	17.0
163	1275	2	1	1180	80	74	64	8.0
164	1225	2	1	1225	80	74	62	6.0
165	1245	2	1	1230	83	74	63	4.0
166	1200	2	4	1283	81	74	63	2.0
167	1200	2	2	1180	81	74	61	7.0
168	1200	2	2	1105	78	74	60	10.0
169	1175	2	1	1140	77	74	63	4.0
170	1000	2	2	930	75	68	55	6.0
171	950	2	1	1013	76	68	59	3.0
172	950	2	5	1030	77	68	61	1.0
173	1000	2	2	920	76	68	58	18.0
174	965	2	2	980	75	69	57	7.0
175	975	2	5	1030	77	69	57	6.0
176	1200	2	1	1240	80	75	63	4.0

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
177	1075	2	1	1182	81	75	65	6.0
178	1150	2	1	1162	79	75	62	10.0
179	1350	2	1	1282	81	75	62	7.0
180	1230	2	1	1255	82	75	63	8.0
181	1050	2	2	1210	80	75	62	11.0
182	1275	2	1	1386	84	76	62	11.0
183	1275	2	2	1230	83	76	61	6.0
184	1280	2	1	1246	81	76	62	17.0
185	1100	2	1	1208	80	76	60	4.0
186	1250	2	2	1206	82	76	63	17.0
187	1200	2	1	1280	84	76	64	5.0
188	1175	2	1	1250	79	77	64	11.0
189	1225	2	2	1327	83	77	63	11.0
190	1000	2	5	1165	78	77	61	1.0
191	1305	2	2	1060	78	71	57	7.0
192	1090	2	1	1045	77	71	58	1.0
193	975	2	1	1072	78	71	61	7.0
194	1275	2	1	1137	81	71	65	15.0
195	1100	2	2	1075	80	71	60	10.0
196	1180	2	1	1157	79	72	61	16.0
197	1100	2	1	1194	80	72	60	9.0
198	1180	2	2	1160	81	72	59	5.0
199	1100	2	1	1165	79	72	60	4.0
200	1150	2	1	1198	83	72	63	13.0
201	1050	2	1	1209	82	72	60	11.0
202	1100	2	1	1131	80	72	64	21.0
203	950	2	1	1130	79	72	61	11.0
204	1150	2	2	1090	77	72	59	1.5

## Equine Weight Estimation Research Database

ID	ESTWT	BREED	GENDER	ACTWT	LENGTH	GIRTH	HEIGHT	AGE
205	1100	2	1	995	78	72	62	16.0
206	1240	2	2	1225	83	73	60	11.0
207	1300	2	1	1295	83	73	62	8.0
208	1000	2	1	1036	75	73	57	22.0
209	1275	2	1	1200	83	73	62	4.0
210	1350	2	1	1220	82	73	64	5.0
211	1075	2	1	1190	82	73	63	9.0
212	1175	2	1	1130	78	73	63	9.0
213	1350	2	1	1393	89	78	63	9.0
214	1400	2	1	1660	88	83	67	3.0
215	1325	2	4	1490	86	82	65	3.0
216	375	2	4	618	65	59	52	0.8
217	700	2	2	730	70	63	52	7.0
218	750	2	2	696	69	63	51	19.0
219	960	2	2	826	70	66	54	15.0
220	850	2	2	740	68	66	52	15.0
221	985	2	1	921	74	66	57	7.0
222	800	2	5	828	69	65	53	4.0
223	2	2	5	682	66	60	53	0.6
224	250	2	5	303	49	45	43	0.3

**[0046.]** The software program 70 and/or the weight estimation logic 74 can be implemented in any suitable programming language or format. For example, Visual Basic 6.0, or C++ can be utilized to implement the software program 70 and/or the



weight estimation logic 74. Set forth hereinafter is one embodiment of the software program 70, which was written in Visual Basic 6.0.

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```

Main - 1

Private Sub Command1_Click()
    If Text1.Text > "1" And Text2.Text > "1" And Text3.Text > "1" Then
        Text4.Text = CInt(0.003584 * (Text1.Text ^ 1.630634) * (Text2.Text ^ 0.954088) * (Text3.Text ^ 0.39986))
    End If
End Sub

Private Sub mnuAbout_Click()
    Dim f As New About
    f.Show
End Sub

Private Sub mnuExit_Click()
    Unload Me
End Sub

Private Sub mnuHelpGirth_Click()
    Dim f As New Girth
    f.Show
End Sub

Private Sub mnuHelpHeight_Click()
    Dim f As New Height
    f.Show
End Sub

Private Sub mnuHelpLength_Click()
    Dim f As New Length
    f.Show
End Sub

Private Sub mnuReset_Click()
    Text1.Text = ""
    Text2.Text = ""
    Text3.Text = ""
    Text4.Text = ""
End Sub

```

```
VERSION 5.00
Object = ".{6B7E6392-850A-101B-AFC0-4210102A8DA7}#1.3#0"; "COMCTL32.OCX"
Begin VB.Form Main
    Caption           = "Equi-Calc"
    ClientHeight      = 5130
    ClientLeft        = 165
    ClientTop         = 450
    ClientWidth       = 7800
    LinkTopic         = "Main"
    MaxButton         = 0   'False
    MinButton         = 0   'False
    ScaleHeight       = 5130
    ScaleWidth        = 7800
    StartUpPosition  = 2   'CenterScreen
    Begin VB.PictureBox PictureBox1
        Appearance     = 0   'Flat
        AutoSize       = -1  'True
        BackColor      = &H800000005&
        ForeColor      = &H800000008&
        Height         = 675
        Left           = 5520
        Picture        = (Bitmap)
        ScaleHeight    = 645
        ScaleWidth     = 1785
        TabIndex       = 9
        Top            = 2760
        Width          = 1815
    End
Begin ComctlLib.StatusBar StatusBar1
    Align             = 2   'Align Bottom
    Height            = 375
    Left              = 0
    TabIndex          = 8
    Top               = 4755
    Width             = 7800
    ExtentX           = 13758
    ExtentY           = 661
    SimpleText        = ""
    Version           = 327682
    BeginProperty Panels {0713E89E-850A-101B-AFC0-4210102A8DA7}
        NumPanels      = 3
        BeginProperty Panel1 {0713E89F-850A-101B-AFC0-4210102A8DA7}
            Object.Width      = 6174
            MinWidth         = 6174
            Picture           = {Binary}
            TextSave          = ""
            Key               = ""
            Object.Tag        = ""
        EndProperty
        BeginProperty Panel2 {0713E89F-850A-101B-AFC0-4210102A8DA7}
            Style              = 5
            Object.Width      = 1764
            MinWidth         = 1764
            TextSave          = "7:38 AM"
            Key               = ""
            Object.Tag        = ""
        EndProperty
        BeginProperty Panel3 {0713E89F-850A-101B-AFC0-4210102A8DA7}
            Style              = 6
            Object.Width      = 1764
            MinWidth         = 1764
            TextSave          = "3/12/01"
            Key               = ""
            Object.Tag        = ""
        EndProperty
    EndProperty
EndProperty
BeginProperty Font {0BE35203-8F91-11CE-9DE3-00AA004BB851}
    Name                = "MS Sans Serif"
```

```

    Size           = 8.25
    Charset        = 0
    Weight         = 400
    Underline      = 0 'False
    Italic         = 0 'False
    Strikethrough  = 0 'False
EndProperty
End
Begin VB.CommandButton Command1
    Caption        = "Calculate"
    Height         = 375
    Left           = 3840
    TabIndex       = 4
    Top            = 3120
    Width          = 1095
End
Begin VB.TextBox Text4
    Appearance      = 0 'Flat
    BeginProperty DataFormat
        Type          = 1
        Format         = "#,##0"
        HaveTrueFalseNull= 0
        FirstDayOfWeek = 0
        FirstWeekOfYear = 0
        LCID           = 1033
        SubFormatType = 1
    EndProperty
    Enabled         = 0 'False
    BeginProperty Font
        Name          = "MS Sans Serif"
        Size           = 12
        Charset        = 0
        Weight         = 700
        Underline      = 0 'False
        Italic         = 0 'False
        Strikethrough  = 0 'False
    EndProperty
    Height          = 375
    Left            = 3840
    TabIndex        = 3
    Top             = 3720
    Width           = 1095
End
Begin VB.TextBox Text3
    BeginProperty Font
        Name          = "MS Sans Serif"
        Size           = 12
        Charset        = 0
        Weight         = 700
        Underline      = 0 'False
        Italic         = 0 'False
        Strikethrough  = 0 'False
    EndProperty
    Height          = 375
    Left            = 3840
    TabIndex        = 2
    Top             = 2520
    Width           = 1095
End
Begin VB.TextBox Text2
    BeginProperty Font
        Name          = "MS Sans Serif"
        Size           = 12
        Charset        = 0
        Weight         = 700
        Underline      = 0 'False
        Italic         = 0 'False
        Strikethrough  = 0 'False

```

```

    EndProperty
    Height      = 375
    Left        = 3840
    TabIndex    = 1
    Top         = 1680
    Width       = 1095
End
Begin VB.TextBox Text1
    BeginProperty Font
        Name      = "MS Sans Serif"
        Size      = 12
        Charset   = 0
        Weight    = 700
        Underline  = 0 'False
        Italic     = 0 'False
        Strikethrough = 0 'False
    EndProperty
    Height      = 375
    Left        = 3840
    TabIndex    = 0
    Top         = 840
    Width       = 1095
End
Begin VB.Image Image1
    Height      = 1050
    Left        = 5640
    Picture     = (Bitmap)
    Stretch     = -1 'True
    Top         = 1440
    Width       = 1500
End
Begin VB.Label Label1
    Alignment   = 1 'Right Justify
    Caption     = "Heart Girth in Inches"
    BeginProperty Font
        Name      = "MS Sans Serif"
        Size      = 12
        Charset   = 0
        Weight    = 700
        Underline  = 0 'False
        Italic     = 0 'False
        Strikethrough = 0 'False
    EndProperty
    Height      = 495
    Left        = 840
    TabIndex    = 10
    Top         = 840
    Width       = 2655
End
Begin VB.Label Label4
    Alignment   = 1 'Right Justify
    Caption     = "Equi-Calc Weight Estimate ="
    BeginProperty Font
        Name      = "MS Sans Serif"
        Size      = 12
        Charset   = 0
        Weight    = 700
        Underline  = 0 'False
        Italic     = 0 'False
        Strikethrough = 0 'False
    EndProperty
    Height      = 495
    Left        = 240
    TabIndex    = 7
    Top         = 3720
    Width       = 3495
End
Begin VB.Label Label3

```

```
*
Alignment      = 1 'Right Justify
Caption        = "Length in Inches"
BeginProperty Font
  Name         = "MS Sans Serif"
  Size         = 12
  Charset      = 0
  Weight       = 700
  Underline    = 0 'False
  Italic       = 0 'False
  Strikethrough = 0 'False
EndProperty
Height         = 495
Left           = 720
TabIndex      = 6
Top            = 2520
Width         = 2775
End
Begin VB.Label Label2
Alignment      = 1 'Right Justify
Caption        = "Height in Inches"
BeginProperty Font
  Name         = "MS Sans Serif"
  Size         = 12
  Charset      = 0
  Weight       = 700
  Underline    = 0 'False
  Italic       = 0 'False
  Strikethrough = 0 'False
EndProperty
Height         = 495
Left           = 720
TabIndex      = 5
Top            = 1680
Width         = 2775
End
Begin VB.Menu mnuHelp
Caption        = "Help"
Begin VB.Menu mnuHelpGirth
Caption        = "Girth"
End
Begin VB.Menu mnuHelpHeight
Caption        = "Height"
End
Begin VB.Menu mnuHelpLength
Caption        = "Length"
End
End
Begin VB.Menu mnuAbout
Caption        = "About"
End
Begin VB.Menu mnuReset
Caption        = "Reset/Clear Calculation"
End
Begin VB.Menu mnuExit
Caption        = "Exit"
End
End
```

```
Private Sub mnuExit_Click()  
    Unload Me  
End Sub
```

[illegible]

VERSION 5.00

Begin VB.Form Girth

    Caption          =    "Girth Measurement Help Screen"  
    ClientHeight     =    5130  
    ClientLeft       =    165  
    ClientTop        =    450  
    ClientWidth      =    7800  
    LinkTopic        =    "Form2"  
    MaxButton        =    0    'False  
    MinButton        =    0    'False  
    ScaleHeight      =    5130  
    ScaleWidth       =    7800  
    StartupPosition  =    2    'CenterScreen

Begin VB.Label Label1

    Caption          =    <...>  
    Height           =    2055  
    Left              =    5040  
    TabIndex          =    0  
    Top               =    1680  
    Width             =    2535  
    WordWrap          =    -1    'True

End

Begin VB.Image Image1

    Height           =    4980  
    Left              =    120  
    Picture           =    (Bitmap)  
    Stretch           =    -1    'True  
    Top               =    0  
    Width             =    4680

End

Begin VB.Menu mnuExit

    Caption          =    "Exit"

End

End



```
Height - 1
Private Sub mnuExit_Click()
    Unload Me
End Sub
```

Height - 1

VERSION 5.00

Begin VB.Form Height

```
Caption      = "Height Measurement Help Screen"
ClientHeight = 5130
ClientLeft   = 165
ClientTop    = 450
ClientWidth  = 7800
LinkTopic    = "Form1"
MaxButton    = 0   'False
MinButton    = 0   'False
ScaleHeight  = 5130
ScaleWidth   = 7800
StartupPosition = 2 'CenterScreen
```

Begin VB.Label Label1

```
Caption      = "The height measurement is obtained by taking the distance in inches"
Height       = 1455
Left         = 4920
TabIndex     = 0
Top          = 2160
Width        = 2655
WordWrap     = -1 'True
```

End

Begin VB.Image Image1

```
Height       = 4980
Left         = 120
Picture      = (Bitmap)
Stretch      = -1 'True
Top          = 0
Width        = 4680
```

End

Begin VB.Menu mnuExit

```
Caption      = "Exit"
```

End

End

```
Length - 1
Private Sub mnuExit_Click()
    Unload Me
End Sub
```

Length - 1

VERSION 5.00

Begin VB.Form Length

```
Caption           = "Length Measurement Help Screen"
ClientHeight      = 5130
ClientLeft        = 165
ClientTop         = 450
ClientWidth       = 7800
LinkTopic         = "Form1"
MaxButton         = 0   'False
MinButton         = 0   'False
ScaleHeight       = 5130
ScaleWidth        = 7800
StartupPosition  = 2   'CenterScreen
```

Begin VB.Label Label1

```
Caption          = <...>
Height           = 1695
Left             = 4920
TabIndex         = 0
Top             = 2040
Width            = 2655
WordWrap         = -1  'True
```

End

Begin VB.Image Image1

```
Height           = 4980
Left             = 120
Picture          = (Bitmap)
Stretch          = -1  'True
Top             = 0
Width            = 4680
```

End

Begin VB.Menu mnuExit

```
Caption          = "Exit"
```

End

End

About - 1

```
Private Sub mnuExit_Click()  
    Unload Me  
End Sub
```

VERSION 5.00

Begin VB.Form About

    Caption          =    "About"  
    ClientHeight     =    5130  
    ClientLeft       =    165  
    ClientTop        =    450  
    ClientWidth      =    7800  
    LinkTopic        =    "Form1"  
    MaxButton        =    0    'False  
    MinButton        =    0    'False  
    ScaleHeight      =    19727.89  
    ScaleLeft        =    105  
    ScaleMode        =    0    'User  
    ScaleTop         =    105  
    ScaleWidth       =    25790.77  
    StartUpPosition  =    2    'CenterScreen

Begin VB.Label Label1

    Caption          =    <...>  
    BeginProperty Font  
        Name          =    "MS Sans Serif"  
        Size          =    12  
        Charset       =    0  
        Weight        =    400  
        Underline     =    0    'False  
        Italic        =    0    'False  
        Strikethrough =    0    'False  
    EndProperty  
    Height           =    2415  
    Left             =    2160  
    TabIndex         =    0  
    Top              =    360  
    Width            =    5295  
    WordWrap         =    -1    'True

End

Begin VB.Image Image1

    Height          =    615  
    Left             =    240  
    Picture          =    (Bitmap)  
    Stretch          =    -1    'True  
    Top              =    120  
    Width            =    1815

End

Begin VB.Menu mnuExit

    Caption          =    "Exit"

End

End

[0047.] From the above description it is clear that the present invention is well adapted to carry out the objects and to attain the advantages mentioned herein as well as those inherent in the invention. While presently preferred embodiments of the invention have been described for purposes of this disclosure, it will be understood that numerous changes may be made which will readily suggest themselves to those skilled in the art and which are accomplished within the spirit of the invention disclosed and as defined in the appended claims.

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